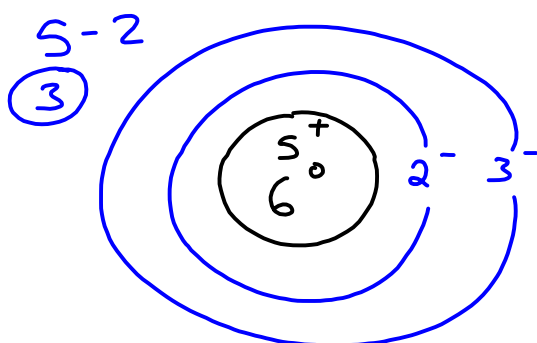


## How To Make A Bohr Diagram:

1. Draw a nucleus
2. Find the atomic number (equals Number of Protons) and write the number of protons in the nucleus.
3. Find the neutrons by: (Atomic mass rounded - Number of protons), and write it in the nucleus.
4. Begin making orbits around your nucleus according to how many electrons you have (same number of protons).
  - 1<sup>st</sup> orbit = max of 2 electrons
  - 2<sup>nd</sup> orbit = max number of 8 electrons
  - 3<sup>rd</sup> orbit = max number of 8 electrons
  - 4<sup>th</sup> orbit = max number of 18 electrons

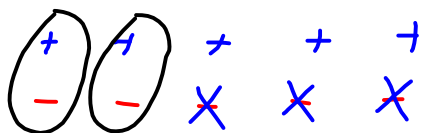
Example: Bohr Diagram for boron (B)



+ - pos  
 0 - neutral  
 - - negative

Boron would  
 like to  
 lose 3 electrons  
 to become

∴ outer orbit is full  
 What is Boron's  
 ionic charge?? =  $(+3)$

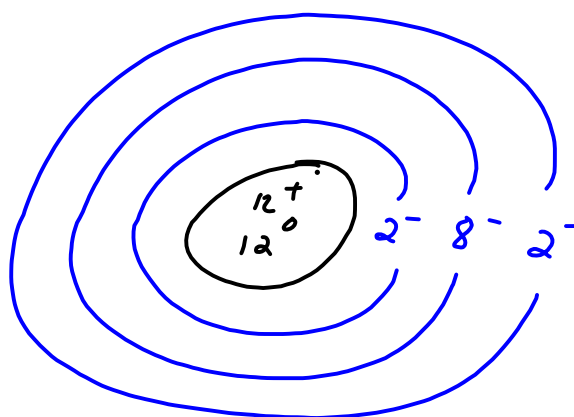


⑫ Mg

P - 12

E - 12

N - 12

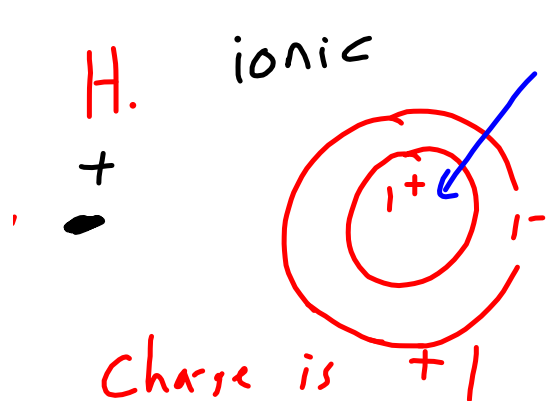


give away  
 2 electron

ionic  
 charge

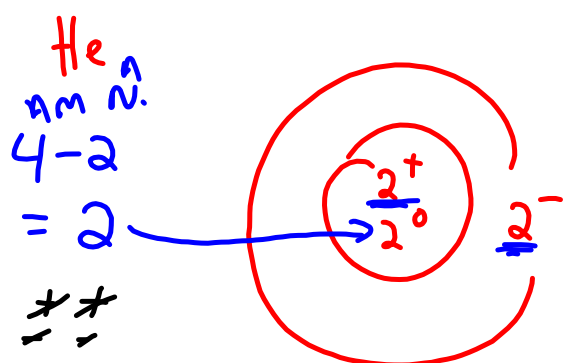
$(+2)$





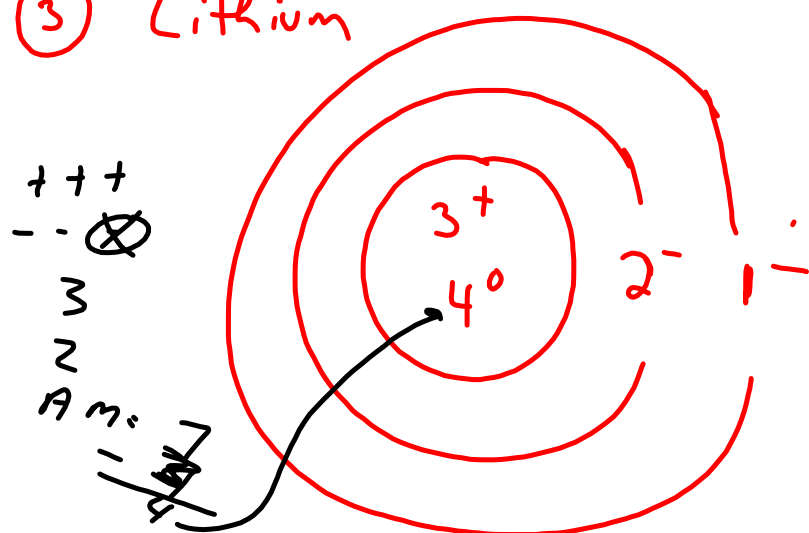
# of protons  
# of neutrons

H tends to give up its electron



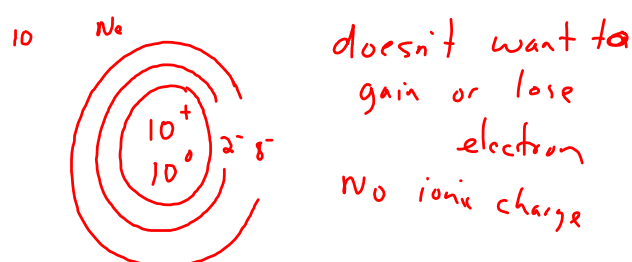
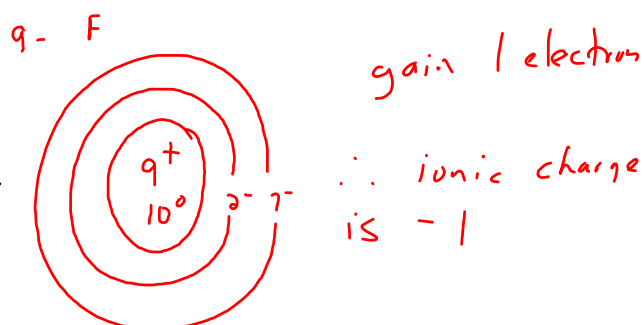
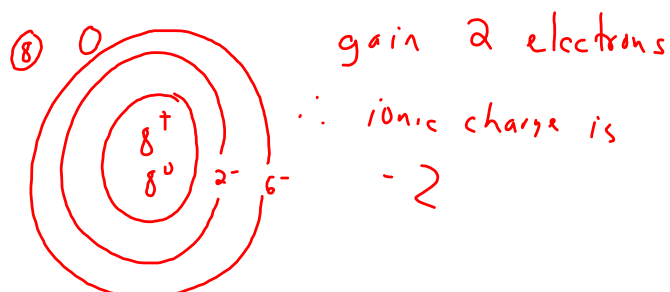
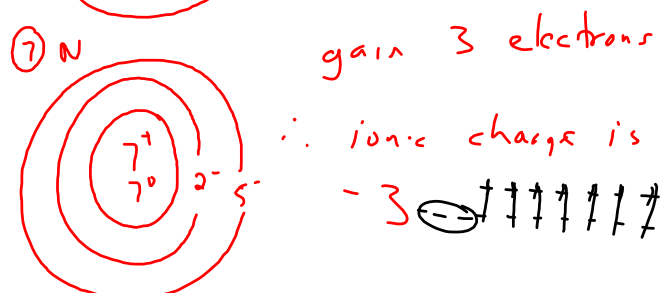
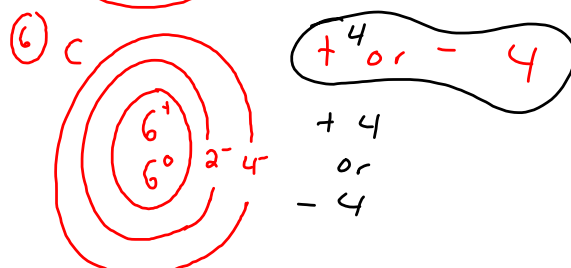
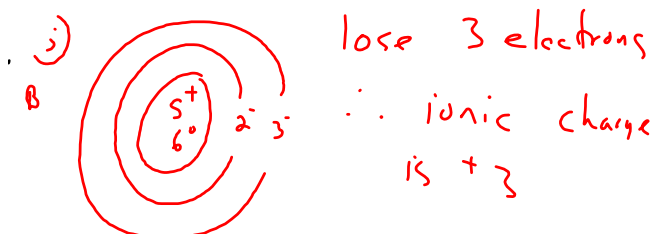
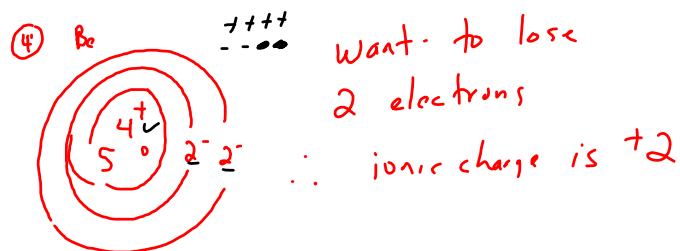
He doesn't want to gain or lose electron  $\therefore$  its charge is 0

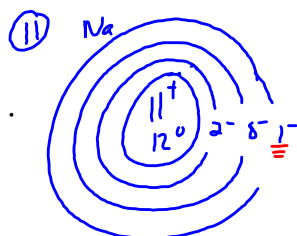
③ Lithium



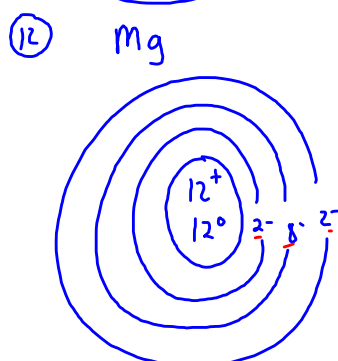
lose 1 electron

$\therefore$  its ionic charge is +1

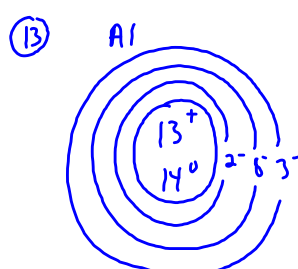




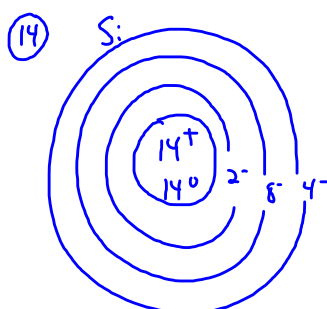
lose 1 electron  
 $\therefore$  charge = +1



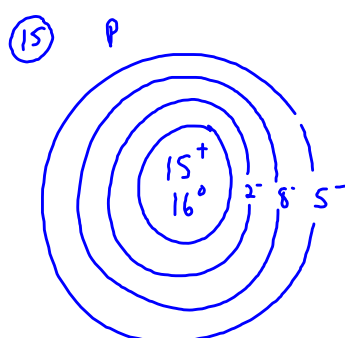
lose 2<sup>-</sup>  
 $\therefore$  charge = +2



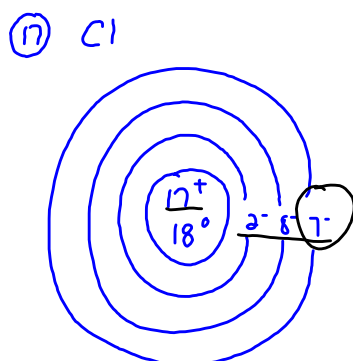
lose 3<sup>-</sup>  
 $\therefore$  charge = +3



gain or lose 4<sup>-</sup>  
 $\therefore$  charge = +4 or -4

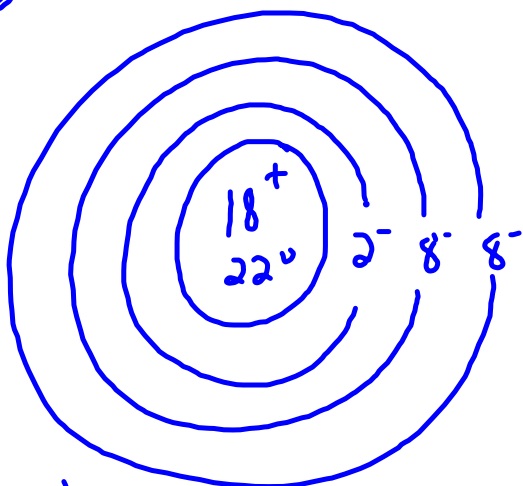


gain 3<sup>-</sup>  
 $\therefore$  charge = -3

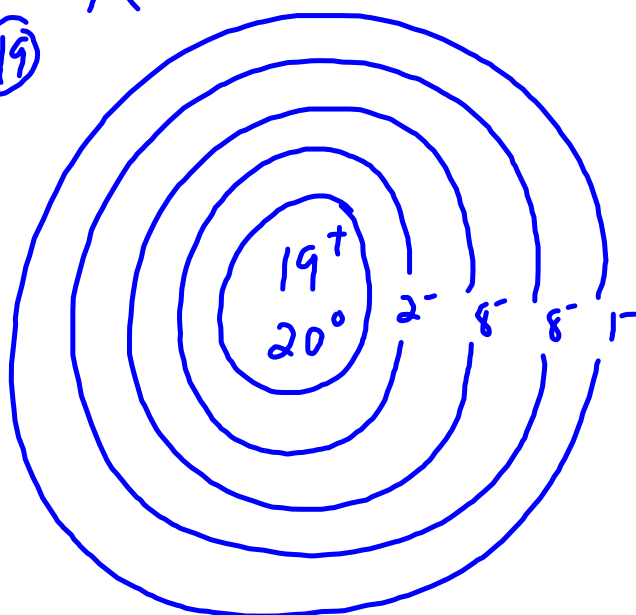


gain 1  
 $\therefore$  charge = -1

18 Ar

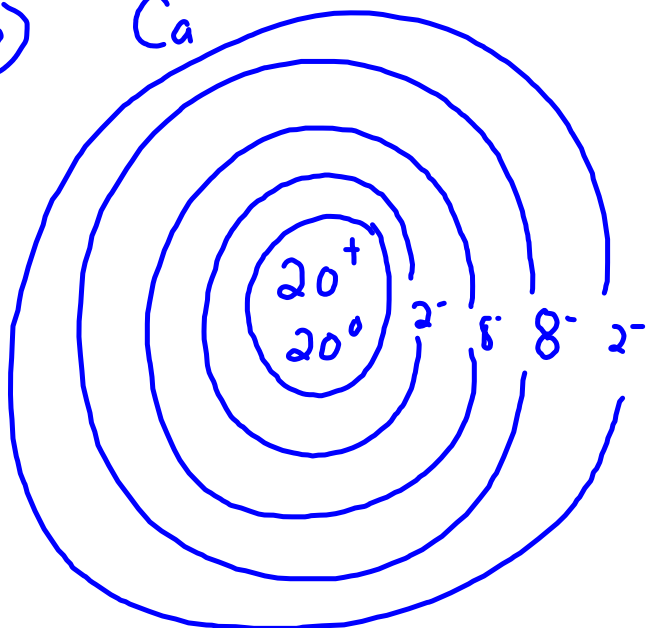


19 K



lose 1<sup>-</sup>  
∴ charge = +1

20 Ca



+2

|   |                                |                                |                                |                                |                                |                                |                                |                                |                                |                                |                                |                                |                                |                                |                                |                                |                                |
|---|--------------------------------|--------------------------------|--------------------------------|--------------------------------|--------------------------------|--------------------------------|--------------------------------|--------------------------------|--------------------------------|--------------------------------|--------------------------------|--------------------------------|--------------------------------|--------------------------------|--------------------------------|--------------------------------|--------------------------------|
|   |                                |                                |                                |                                |                                |                                |                                |                                |                                |                                |                                |                                |                                |                                |                                |                                |                                |
|   | 1.008                          |                                |                                |                                |                                |                                |                                |                                |                                |                                |                                |                                |                                |                                |                                |                                | 4.003                          |
| 1 | <sup>1</sup> <sub>1</sub> H    |                                |                                |                                |                                |                                |                                |                                |                                |                                |                                |                                |                                |                                |                                |                                | <sup>2</sup> <sub>2</sub> He   |
| 2 | 6.941                          | 9.012                          |                                |                                |                                |                                |                                |                                |                                |                                |                                |                                |                                |                                |                                |                                | 20.179                         |
|   | <sup>3</sup> <sub>3</sub> Li   | <sup>4</sup> <sub>4</sub> Be   |                                |                                |                                |                                |                                |                                |                                |                                |                                |                                |                                |                                |                                |                                | <sup>10</sup> <sub>10</sub> Ne |
| 3 | 22.990                         | 24.305                         |                                |                                |                                |                                |                                |                                |                                |                                |                                |                                |                                |                                |                                |                                | 39.948                         |
|   | <sup>11</sup> <sub>11</sub> Na | <sup>12</sup> <sub>12</sub> Mg | III B                          | IV B                           | VB                             | VIB                            | VII B                          | VIII B                         |                                |                                | IB                             | IIB                            |                                |                                |                                |                                | <sup>18</sup> <sub>18</sub> Ar |
| 4 | 39.098                         | 40.08                          | 44.96                          | 47.88                          | 50.94                          | 52.00                          | 54.94                          | 55.85                          | 58.93                          | 58.69                          | 63.546                         | 65.38                          | 69.72                          | 72.59                          | 74.92                          | 78.96                          | 83.80                          |
|   | <sup>19</sup> <sub>19</sub> K  | <sup>20</sup> <sub>20</sub> Ca | <sup>21</sup> <sub>21</sub> Sc | <sup>22</sup> <sub>22</sub> Ti | <sup>23</sup> <sub>23</sub> V  | <sup>24</sup> <sub>24</sub> Cr | <sup>25</sup> <sub>25</sub> Mn | <sup>26</sup> <sub>26</sub> Fe | <sup>27</sup> <sub>27</sub> Co | <sup>28</sup> <sub>28</sub> Ni | <sup>29</sup> <sub>29</sub> Cu | <sup>30</sup> <sub>30</sub> Zn | <sup>31</sup> <sub>31</sub> Ga | <sup>32</sup> <sub>32</sub> Ge | <sup>33</sup> <sub>33</sub> As | <sup>34</sup> <sub>34</sub> Se | <sup>35</sup> <sub>35</sub> Br |
| 5 | 85.47                          | 87.62                          | 88.91                          | 91.22                          | 92.91                          | 95.94                          | (98)                           | 101.1                          | 102.91                         | 106.4                          | 107.87                         | 112.41                         | 114.82                         | 118.69                         | 121.75                         | 127.60                         | 126.90                         |
|   | <sup>37</sup> <sub>37</sub> Rb | <sup>38</sup> <sub>38</sub> Sr | <sup>39</sup> <sub>39</sub> Y  | <sup>40</sup> <sub>40</sub> Zr | <sup>41</sup> <sub>41</sub> Nb | <sup>42</sup> <sub>42</sub> Mo | <sup>43</sup> <sub>43</sub> Tc | <sup>44</sup> <sub>44</sub> Ru | <sup>45</sup> <sub>45</sub> Rh | <sup>46</sup> <sub>46</sub> Pd | <sup>47</sup> <sub>47</sub> Ag | <sup>48</sup> <sub>48</sub> Cd | <sup>49</sup> <sub>49</sub> In | <sup>50</sup> <sub>50</sub> Sn | <sup>51</sup> <sub>51</sub> Sb | <sup>52</sup> <sub>52</sub> Te | <sup>53</sup> <sub>53</sub> I  |
| 6 | 132.91                         | 137.33                         | 138.91                         | 178.49                         | 180.95                         | 183.85                         | 186.2                          | 190.2                          | 192.2                          | 195.08                         | 196.97                         | 200.59                         | 204.38                         | 207.2                          | 208.98                         | (244)                          | (210)                          |
|   | <sup>55</sup> <sub>55</sub> Cs | <sup>56</sup> <sub>56</sub> Ba | <sup>57</sup> <sub>57</sub> La | <sup>72</sup> <sub>72</sub> Hf | <sup>73</sup> <sub>73</sub> Ta | <sup>74</sup> <sub>74</sub> W  | <sup>75</sup> <sub>75</sub> Re | <sup>76</sup> <sub>76</sub> Os | <sup>77</sup> <sub>77</sub> Ir | <sup>78</sup> <sub>78</sub> Pt | <sup>79</sup> <sub>79</sub> Au | <sup>80</sup> <sub>80</sub> Hg | <sup>81</sup> <sub>81</sub> Tl | <sup>82</sup> <sub>82</sub> Pb | <sup>83</sup> <sub>83</sub> Bi | <sup>84</sup> <sub>84</sub> Po | <sup>85</sup> <sub>85</sub> At |
| 7 | (223)                          | 226.03                         | 227.03                         |                                |                                |                                |                                |                                |                                |                                |                                |                                |                                |                                |                                |                                | (222)                          |
|   | <sup>87</sup> <sub>87</sub> Fr | <sup>88</sup> <sub>88</sub> Rd | <sup>89</sup> <sub>89</sub> Ac |                                |                                |                                |                                |                                |                                |                                |                                |                                |                                |                                |                                |                                | <sup>86</sup> <sub>86</sub> Rn |

|                   |                                |                                |                                |                                |                                |                                |                                |                                |                                |                                |                                  |                                  |                                  |                                  |
|-------------------|--------------------------------|--------------------------------|--------------------------------|--------------------------------|--------------------------------|--------------------------------|--------------------------------|--------------------------------|--------------------------------|--------------------------------|----------------------------------|----------------------------------|----------------------------------|----------------------------------|
| Lanthanide Series | 140.12                         | 140.9077                       | 144.24                         | (145)                          | 150.36                         | 151.96                         | 157.25                         | 158.93                         | 162.50                         | 164.93                         | 167.26                           | 168.93                           | 173.04                           | 174.97                           |
|                   | <sup>58</sup> <sub>58</sub> Ce | <sup>59</sup> <sub>59</sub> Pr | <sup>60</sup> <sub>60</sub> Nd | <sup>61</sup> <sub>61</sub> Pm | <sup>62</sup> <sub>62</sub> Sm | <sup>63</sup> <sub>63</sub> Eu | <sup>64</sup> <sub>64</sub> Gd | <sup>65</sup> <sub>65</sub> Tb | <sup>66</sup> <sub>66</sub> Dy | <sup>67</sup> <sub>67</sub> Ho | <sup>68</sup> <sub>68</sub> Er   | <sup>69</sup> <sub>69</sub> Tm   | <sup>70</sup> <sub>70</sub> Yb   | <sup>71</sup> <sub>71</sub> Lu   |
| Actinide Series   | 232.04                         | 231.0369                       | 238.03                         | 237.05                         | (244)                          | (243)                          | (247)                          | (247)                          | (251)                          | (254)                          | (257)                            | (258)                            | (259)                            | (260)                            |
|                   | <sup>90</sup> <sub>90</sub> Th | <sup>91</sup> <sub>91</sub> Pa | <sup>92</sup> <sub>92</sub> U  | <sup>93</sup> <sub>93</sub> Np | <sup>94</sup> <sub>94</sub> Pu | <sup>95</sup> <sub>95</sub> Am | <sup>96</sup> <sub>96</sub> Cm | <sup>97</sup> <sub>97</sub> Bk | <sup>98</sup> <sub>98</sub> Cf | <sup>99</sup> <sub>99</sub> Es | <sup>100</sup> <sub>100</sub> Fm | <sup>101</sup> <sub>101</sub> Md | <sup>102</sup> <sub>102</sub> No | <sup>103</sup> <sub>103</sub> Lr |

## Forming compounds

- elements join together to form compounds

ex. Na - sodium  
Cl - chlorine

Sodium chloride  
 $\text{Na}_2\text{Cl}_2$

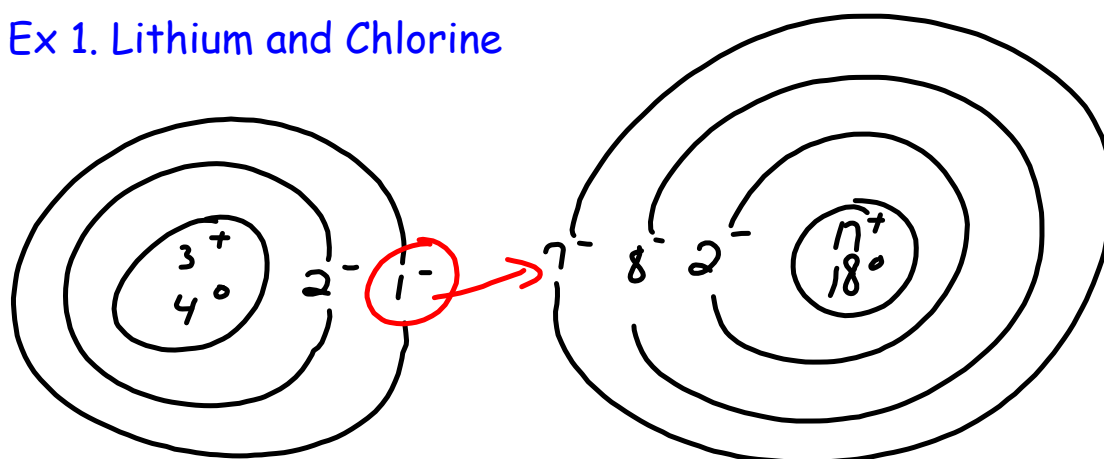
- How and why do certain elements join together, while others do not?
- It all depends on their electron configuration (Bohr diagram)
- All elements want a full outer shell or orbit, so they want to gain or lose electrons to accomplish this.
- Noble gases already have a full shell so they don't form compounds
- metals tend to lose electrons.....they will become positively charged
- non metals tend to gain electrons ....they will become negatively charged
- gaining or losing electrons creates ions
- this difference in charges will hold elements together to form a compound.

Ionic compounds form when a metal donates electrons to a non metal

- the bond or connection between them is called a covalent bond



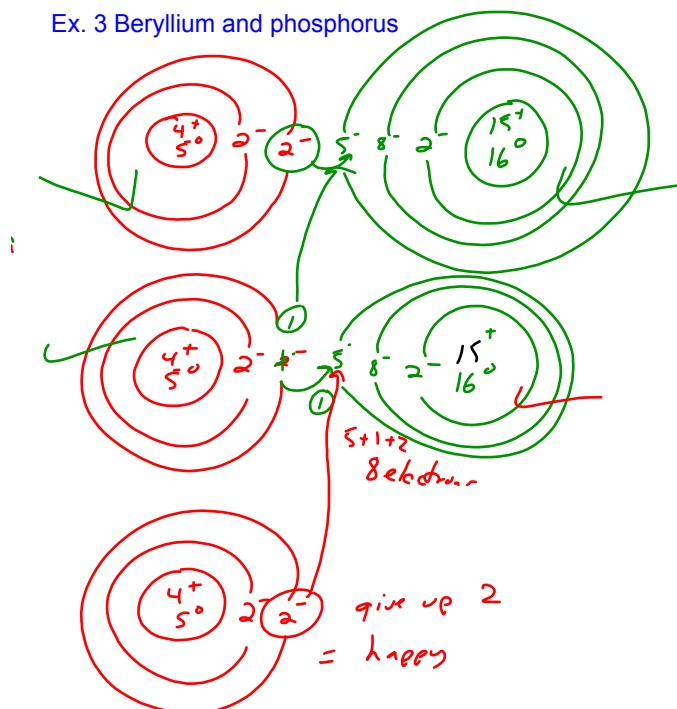
## Ex 1. Lithium and Chlorine



Lithium gave 1 electron to Chlorine,  
they both now have full outer orbits  
and form lithium chloride.

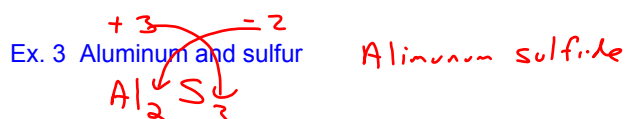
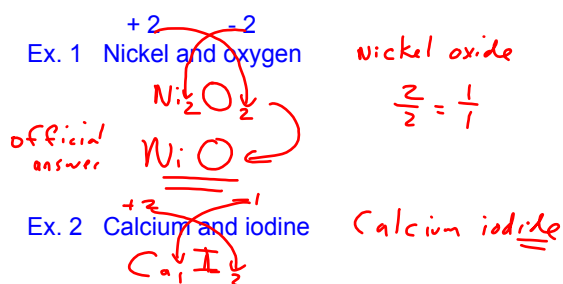
he's going to give nitrogen 3 electrons  
 $\downarrow$   $\therefore$  both are happy  
 ex. 2 Aluminum and nitrogen  
 $\text{AlN} \rightarrow \text{Aluminum nitride}$

## Ex. 3 Beryllium and phosphorus



Now lets use an easier method

1. Write the symbols for each element
2. State the ionic charge of each element above the element
3. Use the crisscross rule
4. Reduce the subscripts (the numbers) like you would a fraction



Add these charges to your table:

Ni  $+2$

Ag  $+1$

As well some transitional elements have more than 1 charge, which are shown as roman numerals. The charge will always be given to you.

ex. copper (II) bromide  
 $+2$   
 $-1$   
 $\text{CuBr}_2$

|     |   |   |
|-----|---|---|
| i   | - | 1 |
| ii  | - | 2 |
| iii | - | 3 |
| iv  | - | 4 |
| v   | - | 5 |

ex. lead (iv) nitride  
 $+4$   
 $-3$   
 $\text{Pb}_3\text{N}_4$